# THE RESULTS OF SURGICAL TREATMENT OF BRAIN TUMORS.

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In order to estimate accurately the prospect of success in any surgical operation, it is wise to consider the results which have been attained in a large number of cases. And while, too great importance should never be attached to statistics, yet on the other hand, they possess a certain value and are never without an element of interest. In 1893, I was able to collect seventy cases of brain tumor in which an operation had been undertaken,[1] and in 1896 and 1897, I analyzed the results in two hundred and twenty cases in which a surgical operation had been attempted.[2] As a knowledge of the possibility of operation has become more widespread, and as the technic of brain surgery has become more perfect, reports of such operations have been more frequent, and it has been possible to collect 365 cases up to January 1, 1903.[3] In the appendix to this article the cases which have been published since January 1, 1896, are tabulated, all those prior to that time being referred to either in *Brain Surgery*, or in the *Medical Record* for February 1, 1896, or in the article in the *Montreal Medical Journal* for November, 1897.

TABLE OF RESULTS OF OPERATION FOR BRAIN TUMOR.

| | | *Cerebral.* | *Cerebellar.* |
|---|---|---|---|
| Total number of cases operated upon | 365 | 315 | 50 |
| Cases in which the tumor was not found | 111 | 91 | 20 |
| Cases in which the tumor was found but not removed | 27 | 21 | 6 |
| Cases in which the tumor was removed and the patient died | 59 | 51 | 8 |
| Cases in which the tumor was removed and the patient recovered | 168 | 152 | 16 |

There are two elements which render the chances of success in the operation for brain tumors better at present than formerly.

(1) The accuracy of diagnosis and the accuracy of localization

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[1] Brain Surgery, Wm. Wood & Co., 1893.

[2] New York Medical Record, February, 1896. Montreal Medical Journal, November, 1897.

[3] These cases have been gathered from the literature for me by Dr. O. Hensel.

of tumor are today more easily possible than before. Given a history of a slowly progressing disease with symptoms of headache, vomiting, vertigo, sensations of cerebral discomfort, progressive emaciation and feebleness, and a gradual loss of sight due to a choked disc, and the only probable hypothesis is the existence of a brain tumor. No other disease can produce this particular combination of symptoms. Hence the diagnosis of the nature of the disease is not difficult.

The possibility of locating tumors has also become more definite within the last twenty years. This diagnosis is wholly by direct observation of local symptoms such as (a) mental symptoms, (b) motor or sensory aphasia, (c) local spasm and monoplegia, (d) hemianopsia, (e) cerebellar staggering.

The diagnosis is also one to be reached in part by elimination, for the absence of any one of these localizing symptoms just named, when the disease is clearly a brain tumor, makes it evident that the tumor is inaccessible. It is therefore possible at the present time to determine with considerable accuracy, *first*, that a tumor is present, and, *second*, that the surgeon can reach it.

The chance of success has also been materially increased by the newer surgical methods of access to the brain. It is true that successes had been obtained by the use of the ordinary trephine, the opening being enlarged by a rongeur. It is also true that the method of opening the skull by a horseshoe-shaped incision through scalp, periosteum and bone, by means of a gouge and chisel, has been attended by greater success. This method was a distinct improvement upon the method by the use of the trephine. But during the past three years these two methods have been superseded by the use of the electrical saws. In the larger hospitals it is perfectly possible to obtain a powerful electrical engine connected with a flexible tube, on the end of which revolving spools can be inserted. The method at present used by McCosh at the Presbyterian Hospital seems to me the best method as yet devised for entering the skull. A small bulb of the shape of a pear, about one-quarter of an inch in diameter, is attached to the electrical engine, and with this bulb four or five small holes are bored through the skull. The cone-shape of the bulb allows the point to penetrate through the skull as it is revolved, and yet prevents the shaft from entering the skull or penetrating the dura. It requires but a few seconds with the powerful revolutions of this bulb, that are obtained by the machine, to bore one of these holes. The number of holes and their position upon the skull are determined entirely by the area that it is desired to expose. If four holes are bored they are from one and a half to four inches apart. When these holes have been made the bulb is removed from the machine and there is substituted a small circular saw and the bone between these holes is quickly sawed through by it. A small projecting and protecting flange is screwed to the side of the circular saw so that the blade of the saw is exposed only for the depth of the skull as measured through the holes, and in this way the danger of sawing through the dura is wholly obviated. It requires hardly a minute when the saw is properly adjusted to saw through the skull from one hole to the next. In this manner the skull can be opened in from six to eight minutes after the original incision has been made through the scalp. This method offers great advantages in the rapidity with which access can be had to the brain.

Experience has taught that it is a great advantage in the extraction of tumors to have plenty of space, and it has also taught that these large bony flaps can be replaced and will unite without any danger. The bony flap is turned downward, as a rule, the lower edge of the flap not being sawn entirely through, but cracked. It is left attached to the periosteum and skin. The incision in the scalp will be determined in its shape by the incision which it is proposed to make in the bone. This may be rectangular or polygonal. Much time is saved in the operation by making the bony flap of large size, as in former operations it was often necessary to delay for the enlargement of the bony opening after the tumor had been found. By the use of this method, I have frequently seen the brain exposed within ten minutes of the time of the beginning of the operation; while in prior methods from eighteen to twenty-five minutes were often expended in this preliminary stage.

Another factor in success in these operations is the fact that we have come to the conclusion that extensive cutting of the brain and exsection of parts of the brain are not necessarily attended by danger, provided the hemorrhage can be arrested. I have seen large areas, two to three inches in diameter, cut out of the brain, to a depth of two to three inches, and I have seen the patients recover. While the difficulties attendant upon the extraction of a deep tumor are many, and while the chances of subsequent recovery, first, from the operation, and, second, from the symptoms, are much less in such deep tumors, yet it must be conceded that a tumor lying one or two inches below the surface may be reached.

For these reasons it seems to me probable that the statistics of the next ten years will show a very much greater percentage of successes than do the statistics up to the present time.

The operation for cerebellar tumors appears to me to be of great difficulty and danger. But one-tenth of each hemisphere of the cerebellum can be reached by the surgeon through the occipital fossa. This I have determined by measurements of the surface many times in the cadaver. The surface which is accessible is one which is very rarely the seat of a cerebellar tumor. Cerebellar tumors lie either in the middle lobe of the cerebellum directly beneath the tentorium, a point which cannot be reached from the lower surface of the cerebellum, or else they lie in the sulci between the cerebellum and the pons and medulla oblongata, upon the base of the brain, a point which is equally inaccessible. For this reason failures are numerous in operations for cerebellar tumor, and after a considerable experience (I have had nine such cases operated upon without any success) it seems to me futile to attempt this operation.

The causes of failure are: First, mistakes in the diagnosis of the location of the tumor. In a certain percentage of tumors these mistakes are inevitable. Certain local symptoms of tumor which appear to point to a clear localization do occur in some cases when the tumor is at a considerable distance from the point where it is supposed to lie. The local symptoms are therefore not infallible in their indication.

Secondly, some tumors, even when accessible, cannot be removed. They are infiltrating gliomata without any boundary and with a vascular, softened tissue about them which prevents enucleation, and this variety of tumor is particularly liable to return even if removed in part.

Thirdly, the dangers of hemorrhage and the dangers of meningitis are less dreaded at present than formerly, proper asepsis preventing the latter complication in all cases.

## APPENDIX BY DR. O. HENSEL.

### VARIETY OF TUMOR REMOVED AND RESULTS.

### 1893-1903.

| | *Recovered.* | *Died.* |
|---|---|---|
| Sarcoma | 34 | 13 |
| Melanosarcoma | 1 | — |
| Cystosarcoma | 1 | — |
| Gliosarcoma | 5 | — |
| Glioma | 8 | 5 |
| Neuroglioma | 2 | — |
| Perithelioma | 1 | — |
| Endothelioma | 3 | 3 |
| Carcinoma | 1 | — |
| Hydatid Cyst | 4 | 1 |
| Cyst | 22 | 7 |
| Tubercle | 11 | 4 |
| Gumma | 5 | 2 |
| Fibroma | 1 | 2 |
| Angioma | 4 | — |
| Osteoma | 1 | — |
| Not stated | 16 | 9 |
| | 120 | 46 |

### TUMOR TREPHINED FOR BUT NOT FOUND.

*Central Region.*—1-2. Bramwell, *Boston Med. Journ.*, Dec., 22, 1900, 2 cases, glioma right motor region, no tumor found, death in 9 months.—3. Hoppe, *Journ. of Amer. Med. Assoc.*, Feb. 2, 1901, Tubercle in lentiform nucleus of right side, extending to within ½ inch of cortex in ascending frontal and parietal regions and inward and downward to internal capsule. Death in 6 hours.—4. Hoppe, *ibid.*, Gliosarcoma, extending 2 inches from tip of 1st frontal convolution, back along longitudinal fissure to 2 inches posterior to fissure of Rolando. Death on same day.—5. Hoppe, *ibid.*, Multiple cysts. Trephined at lower extremity of fissure of Rolando. Death from cerebral hemorrhage.—6. Schulze, *Deutsche Zeitschrift f. Nervenheilk.*, 1896. Sarcoma in left facial center, death.—7. Clarke, *Glasgow Med. Journ.*, 48, p. 13. Motor area trephined, not found, death, no autopsy.

*Frontal Region.*—8. Hitzig. *Therap. Wochenschrift,* 1896. Glioma, right frontal lobe, death soon after operation.—9. Zenner, *Transactions of American Neurological Association,* May, 1897. Subcortical growth in prerolandic gyrus.—10. Stochow, *Inaugural Dissert.*, Erlangen, 1896. Tumor, left frontal lobe on autopsy.—11. Hahn and Ruheman, *Deutsche med. Wochenschrift*, 1896. Trephined in frontal region, not found. Was in 2d and 3d frontal convolution. Improvement.—12. Clarke, *British Med. Journ.*, Oct. 13, 1900. Glioma, left frontal lobe, not found, death next day.—13. Armitage, *Lancet*, Nov. 26, 1898. Cortical growth, superior and middle frontal convolution.—14. Gordinier, *American Journ. of Med. Sciences,* May, 1899. Glioma, second left frontal convolution.

*Parietal Region.* — 15. Williamson, *British Med. Journ.*, July 6, 1901. Sarcoma at right parieto-occipital fissure, death in 1 month.—16. Rossolimo, *Arch. f. Psych.*, xxix. Cavernous angioma of left paracentr. lobe, death in 15 hours of hemorrhage.—17. Lambotte, *Annals de la Soc. Belg. de Chir.*, 1896. Trephined in occipital region. Was in angular gyrus. Death.

*Temporal Region.*—18. Gessler and Bayha, *Würtemb. ärzt. Correspbl.*, 1897. Tumor in temporal lobe, death in 6 days. —19. Starr and Weir, *Medical News,* Aug. 7, 1897. Glioma.—20. *Transactions of the American Neurological Association,* May 5, 1897. Sarcoma in left temporal lobe.—21. Starr, *British Med. Journ.,* Oct. 16, 1897. Glioma, trephined for in left 3d frontal convolution, death.

*Occipital Lobe.*—22. Barette, *Soc. de Chirurg. de Paris,* Nov. 11, 1897. Neuroglioma of occipital lobe, compressing longitudinal sinus and causing a swelling in the frontal region, which could not be removed on account of hemorrhage.

*Deeper Parts of Brain.*—23. Mingazzini, *Deutsche Zeitschrift f. Nervenheilk.,* 1900. Sarcoma in right island and corpus striatum.24. Broca, *Arch. gen. de Mèd.,* 1896. Tumor of chiasma, could not be found, ventricles drained, death in 2 weeks.—25. McBurney, *Med. Record,* 1896. Sarcoma of left centrum ovale and base. Death.—26. McCosh, *Med. Record,* 1896. Tumor of corpora quadrigemina. No change after operation.—27. Bury, *British Med. Journ.,* Nov., 1896. Tubercle of optic thalamus. Death in 2 months.—28. Glaser, *Langenbeck's Arch.,* i, 1901. Glioma, region of calamus scriptorius, death in ¾ hours.—29. Rohner, *Rev. Mèd. de l'Est.,* xxx, 1898. Basal tumor.—30. D'Alloco, *La rif. med.,* 1897. Optic thalamus.—31. Gordinier, *Alb. Med. Annals,* 1898. Centrum ovale, died.—32. Thomas and Hamilton, *Journ. of Exp. Med.,* 1897. Corpus callosum, died.—33. Taylor, *Journ. of Exp. Med.,* ii, 6. Optic thalamus, died.—34. Thompson and Ferguson, *Glasgow Med. Journ.,* 56, p. 424-429. Tubercle, suspected in motor area, found on autopsy in lenticular and caudate nuclei.—35. Starr, *British Med. Journ.,* Oct. 16, 1897. Large sarcoma in basal ganglia, under area exposed. Death, 2 weeks.—36. Schulze, *Deutsche Zeitschrift f. Nervenheilk.,* 1896. Gliosarcoma at right side of base with hydrocephalus of left lateral ventricle.

*Cerebellum.*— 37. Ziegenweide, *Psych. en neurol. Bl.,* 1899. Suspected in cerebellum, on autopsy found between right cerebellum, tentorium and pons.—38. Heidenhain, *Arch. f. klin. Chirurgie,* 64, p. 848. Sarcoma of upper and lower worm. Death in 7 hours.—37. Stieglitz, Gerster and Lilienthal, *American Journ. of the Med. Sciences,* Vol. iii, p. 509. Gliosarcoma of right cerebellum, meningitis.—40. Borelius, *Neur. Centralbl.,* 1897. Fibroma of right cerebellum. Death soon after. —41-42. Janz, *Schmidt's Jahrb.,* 1897. Two cases, tumor cerebelli, not found, death.—43. Gerster, *American Journ. of the Med. Sciences,* May, 1896. Cerebellar tumor, not found.—44. D'Alloco, *Rif. med.,* 1897.—45. Starr, *British Med. Journ.,* Oct. 16, 1897. Glioma, right cerebellum, ventricle drained, improvement, death in 8 days.—46. Starr, *ibid.,* Cerebellar tumor, not found. Operation had to be stopped owing to hemorrhage. Discharged in same condition.—47. Descos, *Lyon Mèd.,* xcii. Not found, death.

*Region Not Stated or Indefinite.*—48. Koster and Schiller, *Neurol. Centralblatt,* 1897. Sarcoma, left hemisphere. Death, 2 months after slight improvement.—49. Gould, *Clin. Soc. of London,* Jan. 11, 1898.—50. Sidney, *British Med. Journ.,* 1898, p. 215.—51. Swolfs, *Journal de Neurologie,* 1897, No. 24.—52. Hirsche, *Wiener klin. Wochenschrift,* 1896, No. 5.—53. Nicoll, *Glasgow Med. and Chirurg. Soc.,* March 4, 1898.—54. Fisher, *Transactions of the American Neurological Association,* May, 1897.—55. Langdon, *ibid.*—56. Spencer, *Therap. Gazette,* 1898. Operated in occipital region, recovered.—57. Phillips, *British Med. Journ.,* 1898. Recovered.—58. Spencer and Keene, *Therap. Gazette,* Recovered.—59. Sinkler, *Journ. of Nervous and Mental Disease,* xxi, p. 796. Death in 54 days.—60. Hitzig, *Therap. Wochenschrift,* 1896, Sarcoma, left hemisphere, death in 3 weeks.—61. Hitzig, *ibid.* Patient's condition not changed.—62. Ruheman and Hahn, *Deutsche med. Wochenschrift,* 1896. Operated on cerebellum, position (?) No autopsy.—63. Gibson, *Edinb. Med. Journ.,* Feb., 1896.

### TUMORS FOUND, NOT REMOVED.

*Central Region.* — 64. Krauss, *New York Med. Journ.*, July 30, 1898. Trephined over left arm center and found hard mass 1 inch below cortex which could not be removed. Recovery.—65. Wiener, *New York Med. Journ.*, 1898. Glioma of arm, face and speech centers, too large for removal.—66. Elliot, *Boston Med. and Surg. Journ.*, 1896. Multiple sarcomata of left motor zone, removal intended for a second operation, but death before this after slight improvement.—67. McBurney, *Med. Record*, 1896. Glioma of central convolutions which could not be extirpated. Result (?).—68. Henschen, *Mitth. aus dem Grenzgebiet der Med. und Chir.*, 1898. Too large and diffuse to be removed.—69. Henschen, *ibid.*, too large and diffuse to be removed; death in 8 months.—70. Starr, *British Med. Journ.*, Oct. 16, 1897, Glioma, motor area, could not be removed owing to hemorrhage. Death 24 hrs.—71. Eskridge, *Denver Med. Times*, June, 1896. Glioma, Rolandic area.—72. Fisher, *New York Med. Journ.*, April 16, 1898.—73. King, *Chicago Clinical Review*, April, 1897. Glioma.

*Frontal Region.*—74. Schulze, *Deutsche Zeitschrift für Nervenheilkunde*, 1896. Gliosarcoma of right frontal lobe. Operation interrupted owing to hemorrhage. Death next day.—75. Patel, *Lyon Mèd.*, xciii, 830. Sarcoma.

*Parietal Region.*—76. Nonne, *Neurolog. Centralblatt*, 1899, p. 229. Subcortical sarcoma, left paracentr. lobe. Death 5 months.

*Cerebellum.*—77. Scheede, *Deutsche med. Wochenschrift*, 1900, No. 30, Cystic glioma in worm. Death.—78. Saenger, *Neurolog. Centralblatt*, 1899, p. 1117. Tumor between pons, medulla and cerebellum, slight improvement.—79. Saenger, *ibid.*, Partial recovery.—80. Joffé. *Deutsche med. Wochenschrift*, 1897, No. 5. Fibrosarcoma of right cerebellum. Operation interrupted on account of collapse. Death in 12 hours.

*Region Indefinite or Not Stated.*—81. Jolly, *Berl. klin. Wochenschrift*, 1899, No. 29, Glioma, too diffuse for removal. Death, 2½ years.—82. Colman and Ballance, *British Med. Journal*, March 11, 1896, Cystic glioma in centrum semiovale. One cyst evacuated. Death in 10 months.—83. Labbè, *Bull. et Mem. de la Soc. Anat.*, 55x, 9, 702, Glioma.

### TUMOR REMOVED. RECOVERY.

*Central Region.*—84. Leszynsky, *Med. Record*, Sept. 28, 1901. Endothelioma of right arm and leg center.—85. Hoppe, *Journ. of the Amer. Med. Assoc.*, Feb. 21, 1901. No recurrence after 7 years. No complete cure. Right foot and arm center.—86. Hoppe, *ibid.* Blood cyst from dura over left leg center. Died 18 months in epileptic attack.—87. Mayde, *Wiener klin. Rundschau.* Small cyst, finger center.—88. Heidenhain, *Archiv für klinische Chirurgie*, 64, p. 848. Subcort. cystic sarcoma in right arm center.—89. Treyer, *Rev. méd. de la Suisse romande*, 1900, 5 and 6. Tubercle, right face and arm area. Slight paresis remaining.—90. Treyer, *ibid.* Tubercle, slight paresis remaining.—91. Krauss, *New York Med. Journ.*, July 30, 1898. Sarcoma, left leg center. Death, 2 weeks.—92. Krauss, *ibid.* Infiltrating glioma at junction of leg and arm center, only partly removed. Death, 3 weeks,—93. Oliver and Williamson, *British Med. Journ.*, Nov. 26, 1898. Sarcoma fissure of Rolando. Recurrence.—94. Oliver and Williamson, *ibid.* Subcortical angioma in lower part of left motor region.—95. Stieglitz, Gerster and Lilienthal, *Centralbl. f. Chirurg.*, 1897. Sarcoma, left motor area, recovery.—96. Duncan and Maylord, *Glasgow Med. Journ.*, 1897. Sarcoma of right motor area, improvement.—97. McBurney, *Med. Record*, 1896. Cysts in arm center. Improvement, then death in 6 weeks due to recurrence.—98. Seydel, *Centralbl. f. Chirurg.*, 1896. Fibroma in dura opposite left arm center. Recovery with paresis in leg. — 99. Hirsche, *Centralbl. f. Neurol.*, 1896. Diffuse sarcoma of left motor zone. Partial excision, slight improvement.—100. Devic and Courmont, *Rev. de Mèd.*, 1897. Glioma.—101. Sick, *Deutsche med. Wochenschrift*, 1897, No. 2. Tubercle at lower end of gyrus postrolandicus.—102. Cabot, *Bost. Med. and Surg. Journ.*, June, 1897. Cyst punctured twice in 1¼ years.—103. Champonniere, *Wiener klin. Rundschau*, 1897, No. 49. Sarcoma of central convolutions, improved.—104. Krönlein, *Beiträge z. klin. Chir.*, 1896, p. 253. Tubercle in left arm center.—105. Czerny, *Deutsche med. Wochenschrift*, 1896, No. 11. Cystic sarcoma. motor area.—106. Morison, *British Med. Journ.* Subdural cyst, motor area.—107. Voisin, *XII. Internat. Med. Congr.*, Aug. 24, 1897. Tumor of central convolutions.—108. Washburn and Lane, *Clin. Soc. of London*, March 17, 1897. Endothelioma, left motor region.—109. Friedlander and Schlesinger, *K. k. Gesellsch. f. Aerzte in Wien*, Jan. 21, 1898. Gumma, lower end of anterior central lobe.—110. Doyen, *27. Congress der deutsch. Gesell. f. Chir.* Tumor of central convolution.—111. Carriere, *Congrès de Neurolog. Toulouse*, Aug., 1897. Neuroglioma of motor area.—112. Eliot, *Boston Med. and Surg. Journ.* Cyst in lower arm center, evacuated. Death in 3 months.—113. Bonhoeffer, *Monatschr. f. Psych.*, 1898, No. 3. Glioma, upper one-third of right central. Death, 3 months.—114. Dallas and Mongeri, *Gaz. med. d'Orient*, 1897. Sarcoma, lower end of the left postcentral convolution. Death in 4 months of cachexia.—115. Zenner, *Transactions of the American Neurological Association*, May, 1897. Tumor of central convolution. Death 9 months after second operation.—116. Abrahams and Tait, *Occid. Med. Times*, June, 1896. Recovery.—117. Armstrong, *Montreal Med. Journ.*, May, 1896. Cyst, recovered.—118. Braymer, *Charlotte Med. Journ.*, Nov., 1896.—119. Corine and Doyen, *Bull. de la Soc. d. l. Anat. de Paris*, Dec., 1897. Improved.—120. Crowley, *Transact. Medical Soc. of Calif.*, 1898. Sarcoma, improved.—121. Dreyfus, *Lyon Méd.*, 1898. Gumma, improved.—122. Eskridge and Parkhlli, *Méd. News*, 1896. Cyst, improved.—123. Eskridge and Parkhill, *ibid.* Angioma, improved.—124. Grisson, *Neurol. Centralblatt*, 1898. Cyst, recovered.—125. Hossler, *Neurol. Centralblatt*, 1897. Improved.—126. Mareau, *Arch. med. d'Angres*, 1897. Improved.—127. Mayer, *Annals of Surgery*, 1898. Cyst, improved.—128. Nedwill, *Lancet*, 1898. Hydatid, improved.—129. Stratton and Crowley, *Pac. Med. Journ.*, 1898. Sarcoma, improved.—130. Tauber, *Arch. de Psych. russ*, 1896. Improved.—131. Putnam and Richardson, *Boston Med. and Surg. Journ.*, cxl, p. 129. Sarcoma, motor area, not found at first but removed at second operation at same site. Death, 6 months.—132. Gibson, *Trans. of Med.-chirurg. Soc. of Edinburgh*, N. S., xv, p. 27. Glioma, motor area.—133. Sinkler, *Journ. of Nervous and Mental Disease*, xxi, p. 796. Trephined at right facial center, not found, but found and partly removed at second operation. Death, 1 month.—134. Morestin, *Bull. et Mem. de la Soc. Anat.*, 65 i, 249. Sarcoma of cranium, pressing on motor area.

*Frontal Region.*—135. v. Wagenburg, *Psych. en neurol. Blad.*, 1898. Sarcoma, recovery with slight paralysis.—136. Esteves, *Prog. Med.*, Dec. 23, 1899. Hydatid cyst, recovery.—137. Graff, *Deutsche med. Wochenschrift*, 35, 1899. Cyst, recovery after evacuation.—138. Thomas and Keene, *Amer. Journ. of the Med. Sciences*, Nov., 1896. Gliosarc, recovery with facial paresis and amaurosis.—139. Rossolimo, *Arch. f. Psych.*, xxix, p. 528. Cystic gliosarcoma, death 10 months from recurrence. — 140. Naumann, *Hygiea*, 58, p. 155. Sarcoma periost. cranial, pressing on frontal lobe.—141. Carle, *Rev. de Chirurg.*, Feb., 1899. Sarcoma, recovery.—142. Tubenthal, *Deutsche med. Wochenschrift*, xxv. Cyst, evacuation, recovery.—143a. Fescher, *Deutsche med. Wochenschrift*, xxiv, 52. Gumma, recovery.—143b. v. Bergman, *Berliner klin. Wochenschrift*, 38, p. 219. Tumor, frontal region; recovery.

*Parietal Region.*—144. Clarke and Lansdowne, *British Med. Journ.*, April 19, 1901. Two tumors (encaps. sarcoma) removed within a few weeks.—145. Heidenhain, *Arch. f. klin. Chir.*, vol. lxiv, p. 848. Tubercle, paracentr. lobe, recovery.—146. Bayerthal, *Münch. med. Wochenschrift*, 1899. Tubercle, paracentral lobe, much improvement. — 147. Richardson, *Boston Med. and Surg. Journ.*, 1896. Removed on second trephining.—148. Brissaud, *Bullet. de Chir.*, May, 1896. Tubercle posterior end of the left Sylvian fissure.—149. Starr, *British Med. Journ.*, Oct. 16, 1897. Fibrocyst, inferior parietal lobe. Recurrence in 4 months.—150. Mills and Keene, *Journ. of Nervous and Mental Disease*, 27, p. 244. Endothelioma, superior parietal convolution.—151. Pitt and Lane, *Clin. Soc. Transact.*, 29, p. 164. Sarcoma, recovery.—152. King, *Chic. Clin. Rev.*, April, 1897. Sarcoma, left superior parietal region, recovery.—153. Walton, *Boston Med. and Surg. Journ.*, 144, p. 205. Subcortical parietal cyst, recovery.

*Temporal Region.*—154. Hoppe, *Journ. of Amer. Med. Assoc.*, Feb. 21, 1901. Cyst, first temp.-sphenoid lobe. Recovery with slight aphasia.—155. McCosh, *Med. Record*, 1896. Angioma of pia in left temporal region. Complete recovery.—156. Broca, *Centralbl. f. Chir.*, 1897, Neuroglioma of left temporal lobe. Cure.—157. Hobart, *K. k. Gesell. f. Aerzte in Wien*, June 17, 1898. Gumma, right temporal region.—158. Barr and Nicoll, *British Med. Journ.*, Oct., 1897. Sarcoma in temporal region. Death in 2½ months.—159. Nicoll, *Lancet*, Oct. 29, 1898. Sarcoma originating from middle ear; intracranial portion removed. Death in 2½ months.

*Occipital Lobe.*—160. Hoppe, *Journ. of Amer. Med. Assoc.*, Feb. 2, 1901. Glioma, left occipital lobe. Well after 3 years.—161. Kocher, *Schweiz. Correspbl.*, 27, p. 397. Osteoma growing from occipital bone; recovery.

*Deeper Parts of Brain.*—Heidenhain, *Archiv f. klin. Chir.*, vol. lxiv, p. 848. Melanosarcoma of tela choroid and ependyma of descending cornua. Entire right temporal lobe extirpated.—163. Bastianelli, *Boll. de la Soc. Lancis*, p. xv, 1. Sarcoma of anterior fossa pressing eyeball forward.

*Cerebellum.*—164. Schede, *Deutsche med. Wochenschrift*, 1900, No. 30. Glioma, recovery.—165. Collins and Brewer, *Med. Record*, May 15, 1897. Subcortical right cerebellar tubercle, partly removed. Death, 2½ months.—166. Guthrie, *Practitioner*, 1898. Cerebellar cyst, improved. —167. Moran and Kerr, *Virg. Med. Semi-monthly*. Cyst, improved. —168. Gibson, *Transac. Med. Chirurg. Soc., Edinburgh*, N. S., xv, 27. Fibrosarcoma cerebellum, removed; recovery.—169. Murri, *Lancet*, 1897. Fibrosarcoma, left cerebellum. Incomplete removal, slight improvement.—170. Parkin, *British Med. Journ.*, 1896, p. 1776. Glioma; recovery.—171. Bevor, Ballance and Lumm, *Brain*, 1897. Fibrosarcoma, anterior part, right cerebellum.—172. v. Bergmann, *Berliner klin. Wochenschrift*, 38, p. 219. Cerebellar cyst; recovery.

*Region Indefinite or Not Stated.*—173. Ziehe and Roth, *Deutsche med. Wochenschrift*, 1897, 19. Perithelioma.—174. Weissgerber, *Münch. med. Wochenschrift*, 1896, No. 16. Cyst in cortex.—175. Kosynski, *Medyzyna*, 1898, No. 1-3, 5.—176. Lundmark, *Ups. Lok. For.*, 1898. Cancer, not improved.—177 O'Hara, *Australas. Med. Gazette*, 1898. Hydatid, recovered. — 178. Vance, *Australas. Med. Gazette*, 1898. Hydatid, improved.

### VI. TUMOR REMOVED, DEATH.

*Central Region.*—179. Hirschfelder, *Pac. Med. and Surg. Journ.*, April, 1896. Glioma of right post-central gyrus. Death, 7 days.—180. Breganski and Wrzesmowski, *Centralbl. f. Chir.*, 97. Sarcoma of left Rolandic area. Died of meningitis.—181. Schulze, *Deutsche Zeitschrift f. Nervenheilkunde*, 1896. Sarcoma of left anterior central convolution.

Death of hemorrhage.—182. Stieglitz, Gerster and Lilienthal, *Centralbl. f. Chir.,* 1897. Sarcoma in left arm, face and speech center. Death from hemorrhage.—183. Ballance, *Med.-Chir. Transact.,* vol. lxxix. Cystic angiosarcoma, left arm center. Death due to hemorrhage. Had been evacuated four times and removed once before.—184. Dinkler, *Wanderversamml. der Südwest-deutschen Irrenärzte,* May 22, 1899. Fibroma, death in 12 hours.—185. Booth, *Transactions of the American Neurological Association,* May 6, 1897. Tumor, left leg center. Death in 4 hours from hemorrhage.—186. Ziehen, *Zeitschr. f. prakt. Aerzte,* 1898, No. 1. Fibroma, left motor zone. Death, 8 days from meningitis.—187. Hawkes, *Intercolon. Med. Journ.,* Dec., 1897. Hydatid cyst, left fissure of Rolando. Death in 3 days.—188. Schnitzler, *Centralbl., f. d. g. Therap.,* Feb., 1898. Tubercle, right arm center. Death in 26 hours of edema of brain.—189. Taylor and Eliot, *Boston Med. and Surg. Journ.,* 1896. Endothelioma.—190. Starr, *British Med. Journ.,* Oct. 16, 1897. Sarcoma of left upper motor area, death 6 hours, hemorrhage.

*Frontal Region.*—191. Taylor, *Boston Med. and Surg. Journ.,* Jan., 1896, Endothelioma left frontal region. Death in several hours,—192. Starr, *British Med. Journ.,* Oct. 16, 1897. Cyst, right upper frontal region, removed, recurred; infection with death after second operation.—193. Starr, *British Med. Journ.,* Oct. 16, 1897. Cyst, frontal region, evacuated. Death in 6 days.

*Parietal Region.*—194. Rychlensky, *Medyzyna,* 1897, 1 and 2. Glioma in paracentral lobe. Death two days after evacuation of cyst.—195. Steffenson, *Med. News,* lxxvi, p. 175. Tumor in angular, supramarginal and first temporo-sphenoidal lobe. Death in 2 hours.

*Temporal Region.*—196. Stewart, *Northwest Lancet,* 1897. Sarcoma.

*Deeper Parts of Brain.*—197. Dinkler, *Wanderversamml. der Südwest-deutschen Irrenärzte,* May 22, 1899. Tumor in white substance of left cerebrum. Death of shock.—198. Krogius, *Rev. de Chirurg.,* 16, p. 434. Endothelioma of middle fossa; death.

*Cerebellum.*—199. Pershing, *Med. News,* 1898. Glioma.

*Region Indefinite or Not Stated.*—200. Hitzig, *Therap. Wochenschrift.* Large endothelioma of dura. Death in collapse.—201 and 202. Lundmark, *Ups. Lok. For.,* 1898. Two cases; died soon after operation.

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